A SURVEY ON SECURE ROUTING IN WIRELESS BODY SENSOR NETWORK

Ms. SHAMILE

Assistant Professor, PSGR Krishnammal College for Women, Coimbatore.

ABSTRACT

Wireless body Sensor Networks (WBSNs) includes of tiny nodes with sensing and wireless communications ability. In many routing, power management, and data distribution protocols have been specifically designed for WSNs where energy awareness is an essential design issue. The focus of routing protocols which may differ depending on the application and network architecture. This paper identifies various issues and challenges in detection of effective routing in WBSN. An outline the design for routing protocols in WSN monitor by a wide-ranging survey of different routing techniques. The routing techniques are classified into three classifies based on the essential network structure: flat, hierarchical, and location-based routing. In addition, these methods can be classified into multipath-based, query-based, negotiation-based, QoS-based, and coherent-based depending on the protocol operation. A study of this paper recognizes the design tradeoffs between energy and communication overhead savings in every routing technique and also includes review of advantages, performance issues of each routing technique. This research paper concludes with possible future research areas.

Keywords: Wireless body sensor network, Routing protocol, Flat-based routing, Hierarchical-based routing, Location-based routing, Multipath-based, Query-based, Negotiation-based, QoS-based.

1. INTRODUCTION

Due to recent technological advances, the mechanized of small and low cost sensors became technically and economically feasible. The sensing electronics quantity is related to the environment surrounding the sensor and transforms them into an electric signal. The processing such a signal expose some properties about objects located of the sensor. A huge number of reusable sensors can be system in many applications that require unattended operations. A Wireless Sensor Network WSN includes hundreds or thousands of these sensor nodes. These sensors have the ability to connect either among each other or directly to an external base-station BS. A superior number of sensors allows for sensing over larger physical regions with greater accuracy. Figure 1 shows the representation of sensor node mechanism.
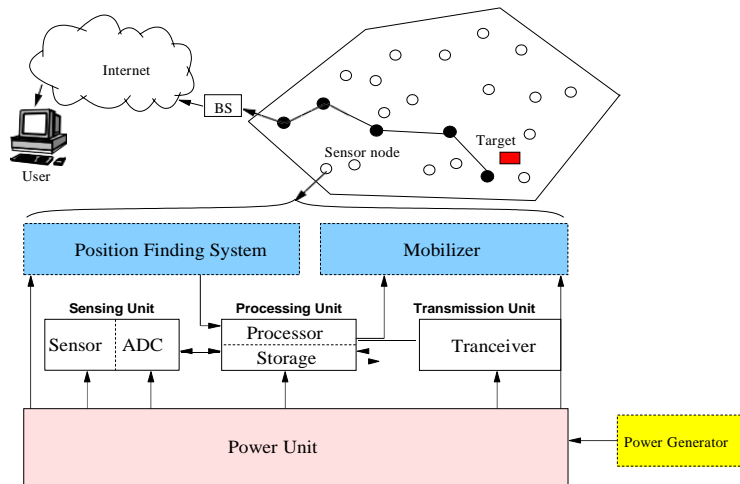
Figure 1: The components of a sensor node

All sensor node bases its decisions on its task, the information it currently has, and its knowledge of its computing, communication, and energy resources. Each of these spread sensor nodes has the ability to collect and transmit data either to other sensors or back to an external base stations . A base-station may be a predetermined node a mobile node capable of connecting the sensor network to an existing communications infrastructure or to the Internet where a user can have access to the reported data.

2. ROUTING CHALLENGES & DESIGN ISSUES IN WSNs

Despite the numerous applications of WSNs, these networks have several restrictions, e.g., limited energy supply, limited computing power, and limited bandwidth of the wireless links connecting sensor nodes. The main motto of WSNs is to carry out data while trying to prolong the lifetime of the network and prevent connectivity degradation by employing aggressive energy management techniques. These factors must be defeat before well-organized communication can be achieved in WSNs. In the following, summarize some of the routing challenges and design issues that affect routing process in WSNs.

· *Node deployment:* Node deployment in WSNs is reliant and involves the performance of the routing protocol. The deployment can be either deterministic or unsystematic. In consumption, the sensors are manually placed and information is routed through determined paths.

· *Energy utilization without losing precision:* The sensor nodes can use up their limited supply of energy performing computations and transmitting information in a wireless environment. Sensor node lifetime displays a strong dependence on the battery lifetime.

- *Data exposure Model:* Data sensing and reporting in WSNs is dependent on the application and the time criticality of the data reporting. Data reporting can be classified as either time-driven (continuous), event-driven, query-driven, and hybrid. The sensor nodes will cyclically switch on the sensors and transmission, sense the environment and transmit the information of interest at constant periodic time intervals.

- *Node Heterogeneity:* In many studies, all sensor nodes were assumed to be standardized having equal capacity in terms of computation, communication, and power. But, depending on the application a sensor node can have different role or capability. The survival same set of sensors raises many technical issues related to data routing.

- *Network:* The network structural design assumes that sensor nodes are stationary. Routing information from moving nodes is more stimulating since route stability becomes an important issue, in addition to energy, bandwidth etc.

- *Broadcast method:* In a multi-hop sensor network, communicating nodes are linked by a wireless medium. The traditional problems associated with a wireless channel may also affect the operation of the sensor network. In general, the required bandwidth of sensor information will be low, on the range of 1-100 kb/s. In related to the transmit data is through medium access control (MAC). The approach of MAC protocol for sensor networks is to use TDMA based protocols that conserve more energy compared to contention based protocols like CSMA ,Bluetooth technology can also be used.

- *Connectivity:* In vital node density in sensor networks prevent them from being totally isolated from each other. In accumulation, connectivity depends on the, possibly random, distribution of nodes.

- *Data Cumulative:* Since sensor nodes may generate significant superfluous information, similar packets from multiple nodes can be aggregated so that the number of transmissions is reduced. In data aggregation is the combination of data from different sources according to a certain aggregation function, e.g., duplicate suppression, minima, maxima and average

- *Quality of Service:* In some applications, information should be transport within a certain period of time from the moment it is sensed; otherwise the data will be useless.

3. ROUTING PROTOCOLS IN WSNs

In this section, a survey the state-of-the-art routing protocols for WSNs. In general, routing in WSN can be divided into *flat-based* routing, *hierarchical-based* routing, and *location-based* routing depending on the network structure. In flat based routing, all connections are naturally assigned equal position. In hierarchical based routing, though nodes will play different roles in the network. In location based routing, sensor nodes positions are browbeaten to route data in the network. A routing protocol is calculated adapt if certain methods parameters can be controlled in order to adapt to the present system conditions and available energy levels. In addition, these protocols can be classified into *multipath-based*, *query-based*, *negotiation-based*, *QoS-based*, or *coherent-based* routing techniques depending on the protocol operation. In accumulation to the above, routing protocols can be classified into three categories, namely, proactive, reactive, and hybrid protocols depending on how the source finds a route to the destination. In positive protocols, all directions are computed before they are really needed, while in reactive protocols, routes are computed on demand. Hybrid protocols use an arrangement of these two

designs. Once, sensor nodes are constant, it is preferable to have table driven routing protocols rather than using reactive protocols. In order to streamline this survey use a classification according to the network structure and protocol operation routing criteria. The categorization is exposed in Figure 2 where numbers in the figure indicate the references.
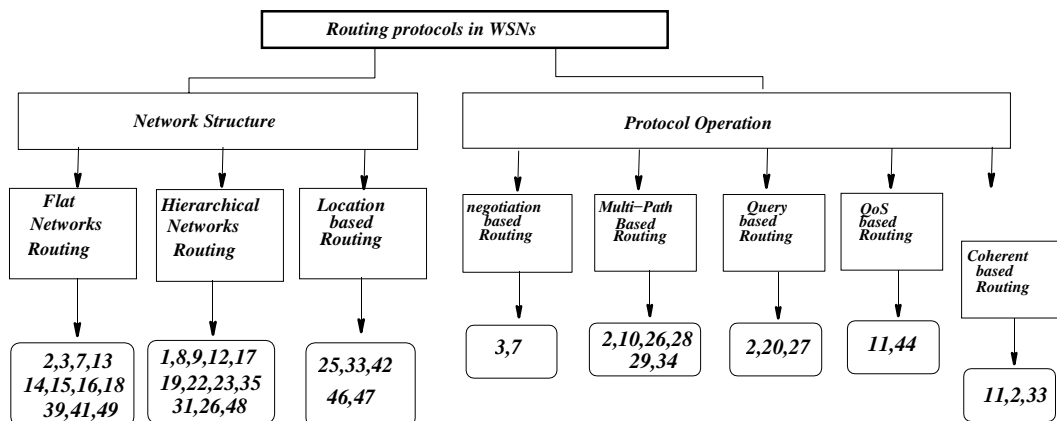

Figure 2: Routing protocols in Wireless Sensor Network

3.1 Network Structure Based Protocols

The essential network structure can play significant role in the operation of the routing protocol in WSNs. In this section, survey in details most of the protocols that fall below this category. It is not sufficient to assign a global identifier to each node.

These factors must be defeat before well-organized communication can be achieved in WSNs. In the following, summarize some of the routing challenges and design issues that affect routing process in WSNs.

A base-station may be a predetermined node a mobile node capable of connecting the sensor network to an existing communications infrastructure or to the Internet where a user can have access to the reported data.

A proliferation of these not reusable sensors can be networked in many applications that require unattended operations. A Wireless Sensor Network WSN includes hundreds or thousands of these sensor nodes. The sensor nodes can use up their partial supply of energy performing computations and transmitting information in a wireless environment.

3.2 Flat Routing

The first group of routing procedures is the multi-hop flat routing protocols. In flat system, each node classically plays the same role and sensor nodes collaborate together to perform the sensing task. Due to the proliferation of such nodes, it is not feasible to allocate a global identifier to each node. The data is being demanded through uncertainty, attribute-based naming is necessary to specify the properties of data. Early works on data centric routing SPIN and directed diffusion was shown to save energy through data negotiation and elimination of redundant data. These two protocols aggravated the design of many other protocols which follow a same concept. In the respite of this part, evaluation these protocols and highlight their advantages and their performance issues.

(a) Propagate Interest   (b) Set up Gradients
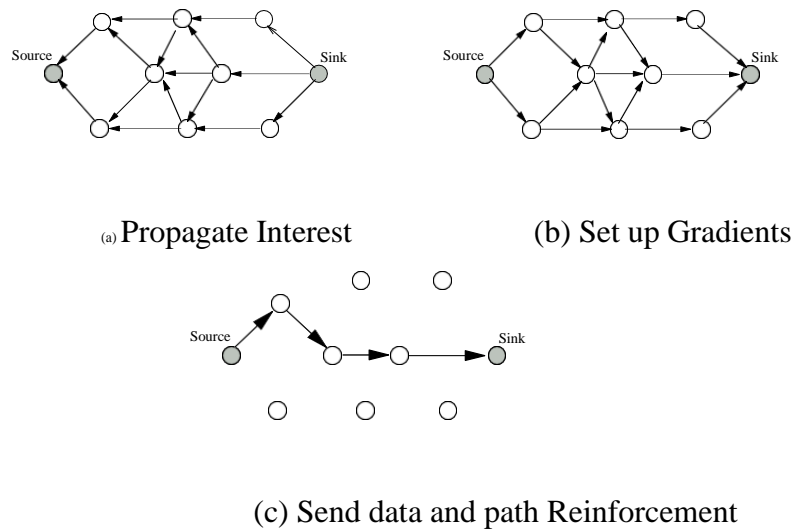
(c) Send data and path Reinforcement

Figure 3: An illustration of interest diffusion in sensor network

All sensor nodes in a bound for diffusion-based network are application-aware, which enables diffusion to achieve energy savings by selecting empirically good paths and by caching and processing data in the network. The accumulation can increase the efficiency, robustness and scalability of coordination between sensor nodes which is the essence of the data diffusion paradigm. In additional usage of directed diffusion is to spontaneously propagate an important event to some sections of the sensor network.

3.3 Hierarchical Routing

Hierarchical based routing, initially proposed in wireless networks, are well-known techniques with special advantages related to scalability and efficient communication. As such, the design of hierarchical routing is also exploiting to perform energy efficient routing in WSNs. In a hierarchical structural design, higher energy nodes can be used to process and send the information while low energy nodes can be used to perform the sensing in the proximity of the target.

3.3.1 LEACH Protocol: Heinemann, initiate a hierarchical clustering algorithm for sensor networks, called Low Energy Adaptive Clustering Hierarchy LEACH. LEACH is a group based protocol, which includes distributed cluster formation. LEACH not sequence choice sensor nodes as cluster heads CHs and rotates this role to evenly distribute the energy load among the sensors in the network. In LEACH, the group head CH nodes compact data arriving from nodes that belong to the respective cluster, and send an aggregated packet to the base station in order to decrease the amount of information that must be transmitted to the base station.

$$N = 1 - p(r(1/p)$$

$$if\ n * G$$

Where G is the set of nodes that are concerned in the CH election. Each selected CH broadcast an advertisement message to the rest of the nodes in the network that they are the new cluster-heads.

3.3.2. SPIN Protocol

SPIN is cooperation based data dissemination protocol suitable for wireless sensor networks. Thus, it imagines that all sensor nodes can be fall potentially. Every node uses Meta data to name their data.

- Sensor nodes control more efficiently and conserve energy by sending data that describe the sensor data instead of sending all the data, image and sensor nodes must monitor the

changes in their energy resources.

- Conventional protocols deluge based routing protocols waste energy and bandwidth after sending extra and unnecessary copies of data by sensors covering overlapping areas.

	SPIN	LEACH	Directed Diffusion
Optimal Route	No	No	Yes
Network Lifetime	Good	Very Good	Good
Resource Awareness	Yes	Yes	Yes
Use of Meta-Data	Yes	No	Yes

Table 1: Difference between SPIN, LEACH and Directed Diffusion.

3.4 Location based routing protocols

In this category of routing, sensor nodes are addressed by means of their locations. The distance connecting neighboring nodes can be estimated on the basis of incoming signal strengths. Relative organize of neighboring nodes can be obtained by exchanging such information between neighbors. The position of nodes may be obtainable exactly by communicating with a satellite, using GPS (Global Positioning System), if nodes are equipped with a small low power GPS receiver. To keep energy, some position based schemes demand that nodes should go to sleep if there is no activity. In additional energy savings can be obtained by having as many sleeping nodes in the network as possible. The problem of designing sleep period schedules for each node in a localized manner was addressed .In the rest of this section, review most of the location or geographic based routing protocols.

4. ROUTING PROTOCOLS BASED ON PROTOCOL OPERATION

In this section, review of routing protocols that different routing functionality. It should be noted that some of these procedures may fall below one or more of the above routing categories.

4.1 Multipath routing protocols

In this subsection, study the routing protocols that use multiple paths rather than a single path in order to enhance the network performance. The authors of proposed the use of a set of sub-optimal paths occasionally to increase the lifetime of the network.

4.2 Query based routing

In this kind of routing, the destination nodes propagate a query for data sensing task from a node through the network and a node sends the information which equal the query assist to the node, which initiates the query. Typically, these queries are express in natural language, high-level query languages. All the nodes have graphed contain of the sensing tasks queries that they receive and send data which matches these tasks when they receive it. As the interest is broadcast during the sensor network, the gradients from the source back to the BS are set up. When the source information for the interest, the source transmits the data along the interests incline path. To inferior energy consumption, data aggregation duplicate suppression is performed enroute.

4.3 Negotiation based routing protocols

These procedures use sophisticated information descriptors in order to eliminate redundant data transmissions through negotiation. The exchange of ideas decisions are also taken based on the resources that are available to them. The SPIN family protocols discussed earlier and the protocols in are examples of negotiation based routing protocols. The incentive is that the use of flooding to distribute information will produce implosion and overlap between the sent data, hence nodes will receive duplicate copies of the same data.

4.4 QoS-based routing

In QoS-based routing protocols, the system has to stability between energy consumption and data quality. In individual, the system has suited certain QoS metrics, e.g., delay, energy, bandwidth, etc. when delivering data to the BS.

5. ROUTING IN WSNs: FUTURE DIRECTIONS

The forthcoming scheme of WSNs is to embed numerous distributed devices to monitor and interact with physical world phenomena, and to exploit spatially and temporally dense sensing and actuation capabilities of those sensing devices. These nodes organize surrounded by themselves to create a network that performs higher-level tasks.

a.Exploit redundancy: typically a large number of sensor nodes are implanted inside or beside the phenomenon. Because sensor nodes are horizontal to breakdown, fault tolerance techniques come in picture to keep the network operating and performing its tasks. Routing methods that clearly employ fault tolerance techniques in an efficient manner are still under investigation.

b.Tiered architectures (mix of form/energy factors): Hierarchical routing is an old technique to enhance scalability and efficiency of the routing protocol. But, novel methods to network grouping which maximize the network lifetime are also a hot area of research in WSNs.

c.Exploit spatial diversity and density of sensor/actuator nodes: Nodes will span a network area that might be large enough to provide spatial communication between sensor nodes. Accomplish energy efficient transfer in this densely populated environment deserves further investigation. The dense consumption of sensor nodes is supposed to allow the network to adapt to unpredictable environment.

d.Achieve desired global behavior with adaptive localized algorithms (i.e., do not rely on global inter-action or information).But, in an active environment this is hard to model.

e.Leverage data processing inside the network and exploit computation near data sources to reduce communication, i.e., perform in-network distributed processing. Wireless sensors are prepared around naming data, not nodes identities. Because, have a huge collections of distributed elements, localized algorithms that achieve system-wide properties in terms of local processing of data before being sent to the destination are still needed. The nodes point in the network will store named data and make it available for processing. At present is high efficient processing points in the network, e.g., duplicate suppression, aggregation, correlation of data. How too capably and most favorable find those points is still an open research issue.

6. CONCLUSIONS

The direction route sensor system is a novel region of research, with a partial but rapidly growing set of research results. In this paper, a comprehensive survey of routing techniques in wireless sensor networks which have been presented in the literature. The general objective of trying to extend the lifetime of the sensor network, while not compromising data delivery.

In general, the routing methods are classified based on the network structure into three categories: flat, hierarchical, and location based routing protocols. Furthermore, these protocols are classified into multipath-based, query-based, negotiation-based, QoS-based routing techniques depending on the protocol operation. In highlight the design tradeoffs between energy and communication overhead savings in some of the routing paradigm, as well as the advantages and disadvantages of each routing technique. Though a lot of these routing techniques look promising, there are still many challenges that need to be solved in the sensor networks. The highlighted those object to identify future research directions in this regard.

REFERENCES

➢ S. Hedetniemi and A. Liestman, "A survey of gossiping and broadcasting in communication networks", IEEE Networks, Vol. 18, No. 4, pp. 319-349, 1988.

➢ J. Kulik, W. R. Heinzelman, and H. Balakrishnan, "Negotiation-based protocols for disseminating information in wireless sensor networks," Wireless Networks, Volume: 8, pp. 169-185, 2002.

➢ A. Manjeshwar and D. P. Agarwal, "TEEN: a routing protocol for enhanced efficiency in wireless sensor networks," In 1st International Workshop on Parallel and Distributed Computing Issues in Wireless Networks and Mobile Computing, April 2001.

➢ A. Manjeshwar and D. P. Agarwal, "APTEEN: A hybrid protocol for efficient routing and comprehensive information retrieval in wireless sensor networks," Parallel and Distributed Processing Symposium., Proceedings International, IPDPS 2002, pp. 195-202.

➢ D. Ganesan, R. Govindan, S. Shenker, and D. Estrin, "Highly-resilient, energy-efficient multipath routing in wireless sensor networks", ACM SIGMOBILE Mobile Computing and Communications Review, vol. 5, no. 4, pp. 1125, 2001.

➢ K. Sohrabi, J. Pottie, "Protocols for self-organization of a wireless sensor network", IEEE Personal Communications, Volume 7, Issue 5, pp 16-27, 2000.

➢ L. Subramanian and R. H. Katz, "An Architecture for Building Self Configurable Systems", in the Proceedings of IEEE/ACM Workshop on Mobile Ad Hoc Networking and Computing, Boston, MA, August 2000.

➢ Y. Yao and J. Gehrke, "The cougar approach to in-network query processing in sensor networks", in SIGMOD Record, September 2002.

➢ D. Braginsky and D. Estrin, "Rumor Routing Algorithm for Sensor Networks," in the Proceedings of the First Workshop on Sensor Networks and Applications (WSNA), Atlanta, GA, October 2002.

➢ C. Schurgers and M.B. Srivastava, "Energy efficient routing in wireless sensor networks", in the MILCOM Proceedings on Communications for Network-Centric Operations: Creating the Information Force, McLean, VA, 2001.